

Claims

- [c1] An electrophoretic medium comprising a plurality of electrically charged particles dispersed in a suspending fluid, the particles comprising at least two types of particles having substantially the same electrophoretic mobility but differing colors.
- [c2] An electrophoretic medium according to claim 1 wherein the electrically charged particles comprise an inorganic pigment.
- [c3] An electrophoretic medium according to claim 1 wherein the electrically charged particles are coated with a coating selected from silica and silica/alumina.
- [c4] An electrophoretic medium according to claim 1 wherein the electrically charged particles are coated with a polymer.
- [c5] An electrophoretic medium according to claim 1 wherein the electrically charged particles and the suspending fluid are held within at least one capsule.
- [c6] A process for forming an electrophoretic medium, the process comprising:

mixing at least two pigments having differing colors to form a mixed pigment;
subjecting the mixed pigment to at least one surface treatment; and
dispersing the surface-treated mixed pigment in a suspending fluid to form at least two types of particles having substantially the same electrophoretic mobility but differing colors.

[c7] A process according to claim 6 wherein the at least one surface treatment comprises coating the mixed pigment with a coating selected from silica and silica/alumina.

[c8] A process according to claim 6 wherein the at least one surface treatment comprises forming a polymer on the mixed pigment.

[c9] A process according to claim 8 wherein the at least one surface treatment comprises treating the mixed pigment with a silane coupling agent to provide sites at which a polymer can be attached to the mixed pigment, and thereafter treating the silylated mixed pigment with at least one monomer and oligomer under conditions effective to cause polymer for form of the mixed pigment surface.

[c10] A process according to claim 6 further comprising en-

capsulating the electrically charged particles and the suspending fluid within at least one capsule.

[c11] An electro-optic display element comprising:
an electro-optic display medium;
an optical biasing element arranged to modify an optical characteristic of the electro-optic display element; and
an addressing electrode to address the electro-optic display medium,
wherein the color of the optical biasing element varies in different portions of the electro-optic display element, so that the optical biasing element forms a color filter.

[c12] An electro-optic display element according to claim 11 wherein the electro-optic display medium is an electrophoretic medium comprising a suspending fluid, a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the suspending fluid, and at least one capsule having a capsule wall surrounding the suspending fluid and the electrically charged particles, the display element optionally comprising a binder surrounding the capsules and/or a lamination adhesive disposed adjacent the electrophoretic medium and/or a front electrode disposed between the electrophoretic medium and a viewing surface of the display, and wherein the optical biasing ele-

ment is disposed in at least one of the capsule wall, the binder, the lamination adhesive and the front electrode.

- [c13] An electrophoretic medium comprising a plurality of capsules, each capsule comprising a suspending fluid, a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the suspending fluid, and a capsule wall surrounding the suspending fluid and the electrically charged particles, the medium further comprising a color filter array having a plurality of non-rectangular pixels.
- [c14] An electrophoretic medium according to claim 13 wherein the pixels of the color filter array are hexagonal, square, or triangular.
- [c15] An electro-optic display comprising a layer of a solid electro-optic medium, at least one electrode arranged adjacent the layer of electro-optic medium so as to apply an electric field thereto, and a color filter array disposed between the electro-optic medium and the electrode, the resistance of the color filter array being not substantially greater than that of the layer of electro-optic medium.
- [c16] An electro-optic display according to claim 15 wherein the color filter array has a volume resistivity not greater

than about 10^{10} ohm cm.

- [c17] An article of manufacture comprising:
a layer of a solid electro-optic medium having first and second surfaces on opposed sides thereof;
a first adhesive layer on the first surface of the layer of solid electro-optic medium;
a release sheet disposed on the opposed side of the first adhesive layer from the layer of solid electro-optic medium; and
a second adhesive layer on the second surface of the layer of solid electro-optic medium.
- [c18] An article of manufacture according to claim 17 further comprising a second release sheet disposed on the opposed side of the second adhesive layer from the layer of solid electro-optic medium.
- [c19] An article of manufacture according to claim 17 wherein the electro-optic medium is an electrophoretic medium comprising a plurality of capsules, each capsule comprising a suspending fluid, a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the suspending fluid, and a capsule wall surrounding the suspending fluid and the electrically charged particles.

- [c20] An article of manufacture according to claim 17 wherein the first and second adhesive layers extend beyond the periphery of the layer of electro-optic medium.
- [c21] An article of manufacture comprising:
a layer of a solid electro-optic medium having first and second surfaces on opposed sides thereof;
a first release sheet covering the first surface of the layer of solid electro-optic medium; and
a second release sheet covering the second surface of the layer of solid electro-optic medium.
- [c22] An article of manufacture according to claim 21 wherein the electro-optic medium is an electrophoretic medium comprising a plurality of capsules, each capsule comprising a suspending fluid, a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the suspending fluid, and a capsule wall surrounding the suspending fluid and the electrically charged particles.
- [c23] A process for forming an electro-optic display, the process comprising:
providing an article of manufacture comprising a layer of a solid electro-optic medium having first and second

surfaces on opposed sides thereof, a first adhesive layer on the first surface of the layer of solid electro-optic medium, a release sheet disposed on the opposed side of the first adhesive layer from the layer of solid electro-optic medium; and a second adhesive layer on the second surface of the layer of solid electro-optic medium; laminating the article to a front substrate via the second adhesive layer, thereby forming a front subassembly; removing the release sheet from the front subassembly; and laminating the front subassembly via the first adhesive layer to a backplane comprising at least one electrode, thereby forming the electro-optic display.

[c24] A process according to claim 23 wherein the front substrate comprises an electrode.

[c25] A process according to claim 23 wherein the front substrate comprises a color filter array.

[c26] A process according to claim 23 wherein the article of manufacture comprises a second release sheet covering the second adhesive layer, and the process comprises removing the second release sheet from the second adhesive layer prior to laminating the article to the front substrate.

[c27] A process according to claim 23 wherein the first and second adhesive layers of the article of manufacture extend beyond the periphery of the layer of electro-optic medium, and wherein during the process the peripheral portions of the first and second adhesive layers are adhered to each other, thereby forming an edge seal around the electro-optic medium.

[c28] A process for forming a color filter array, the process comprising:
imaging a photosensitive film to form a color filter array pattern thereon; and
thereafter depositing a conductive layer on to the photosensitive film.

[c29] A process for forming an electrophoretic display, the process comprising:
providing a color filter array;
providing an electrophoretic medium comprising a plurality of capsules, each capsule comprising a suspending fluid, a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the suspending fluid, and a capsule wall surrounding the suspending fluid and the electrically charged particles;
depositing the electrophoretic medium on the color filter array to form a coated color filter array; and

thereafter laminating the coated color filter array to a backplane comprising at least one pixel electrode.

[c30] A process according to claim 29 wherein the surface of the color filter array is surface treated prior to the deposition to produce regions of varying surface energy on the surface.

[c31] A process for depositing an electrophoretic medium on an electrode, the process comprising:
providing an electrode;
providing an electrophoretic medium comprising a plurality of capsules, each capsule comprising a suspending fluid, a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the suspending fluid, and a capsule wall surrounding the suspending fluid and the electrically charged particles;
surface treating the electrode to produce regions of varying surface energy thereon; and
depositing the electrophoretic medium on the surface-treated electrode.

[c32] A process for forming an electrophoretic display, the process comprising:
providing a front substrate;
providing a backplane;

providing an electrophoretic medium comprising a plurality of capsules, each capsule comprising a suspending fluid, a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the suspending fluid, and a capsule wall surrounding the suspending fluid and the electrically charged particles; surface treating a surface of the front substrate to promote wetting thereof by the capsules; surface treating a surface of the backplane to promote dewetting thereof by the capsules; assembling the front substrate and the backplane together with the treated surfaces thereof facing each other, and with a gap between the treated surfaces; and introducing the electrophoretic medium into the gap, whereby the capsules of the electrophoretic medium pack against the treated surface of the front substrate.